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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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EXAMINER

JOHNSTON, PHILLIP A

ART UNIT PAPER NUMBER

2881

DATE MAILED: 04/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/935,185

Applicant(s)

ANDO ET AL.

Examiner

Phillip A Johnston

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☒ Claim(s) 2 and 5 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Detailed Action

Claims Objection

1. The disclosure is objected to because of the following informalities: in Claim 2 line 14, "claim 2" should be "claim 1", and in Claim 5, line 13, 16, and 17, "light beam" should be "electron beam" .

Appropriate correction is required.

Claims Rejection – 35 U.S.C. 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1, and 5 rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,275,604, to Miyajima.

Miyajima (604) discloses an electron Beam exposure apparatus that includes an electron beam 10 is deflected by a first electromagnetic deflector 19 before passing the plate 11. The electron beam 10 is then deflected by a second electromagnetic deflector 20 before passing any one of the first to third transmission apertures 14-17 of the stencil mask 12. Accordingly, the cross-sectional shape of the electron beam 10 or the shape of its exposure pattern is changed. The electron beam 10 after it has passed the stencil mask 12 is further deflected by a third electromagnetic deflector 21. As a platform or stage 22 is moved along the X and Y axes, a desired pattern is exposed on a predetermined area of a wafer 23 located on the stage 22. The size of a rectangular pattern exposed on the wafer 23 is determined by adjusting the degree of overlapping of the beam passing through the plate 11 with the associated first transmission aperture 14. This exposure scheme is called a variable rectangular system. As the electron beam 10 passes any second transmission aperture 16, the associated recursive pattern is exposed by a single shot. In a block exposure scheme using "recursive blocks", the third electromagnetic deflector 21 and the stage 22 are controlled to expose recursive patterns of the same shape on a plurality of areas of the wafer 23. As this block exposure involves fewer shots, the exposure time is decreased. In a block exposure scheme using "segmental blocks", as an electron beam passes any third transmission aperture 17, the

associated segmental pattern is exposed by a single shot. Combining some segmental patterns permit a pattern of a desired shape to be exposed on the wafer.

Claims Rejection – 35 U.S.C. 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,275,604 to Miyajima et al.

Miyajima (604) also discloses An exposure data generating apparatus receives layout pattern data from a CAD system (not shown) and performs a graphics process on the layout pattern data. The graphics process includes a sizing process, a shrinking process and a rounding process, which converts the coordinates of the layout pattern data to the grids (coordinates) of data the exposure apparatus handles. The exposure data generating apparatus then determines if exposure using the layout patterns on the stencil mask 12 is possible. Exposable layout patterns include, for example, a rectangular pattern 29a in FIG. 4A, right-triangular patterns 29b to 29e in FIG. 4B, parallelogram patterns 29f to 2i in FIGS. 4C and 4D, trapezoidal patterns 29j to 29n in FIGS. 4E and 4F and the patterns of the third transmission apertures 17

shown in FIG. 2. When exposure is possible, the exposure data generating apparatus converts the format of the layout pattern data to an adequate format for the exposure apparatus. See Column 2, line 23-39.

Miyajima (604) further discloses in FIG. 3B a pattern formed by combining triangular patterns 26a and 26b and rectangular patterns 27a and 27b to improve the linearity of the oblique side 24 of the pattern. The triangular patterns 26a and 26b are formed by the third transmission aperture 17, formed in the stencil mask 12. The third transmission aperture 17 has a right-triangular shape including an oblique side, which has the same inclination as the oblique side 24 of the pattern. The pattern can be formed with fewer shots than is required by the scheme in FIG. 3A by individually shooting the triangular patterns 26a and 26b and the rectangular patterns 27a and 27b. The triangular pattern 26b having a relatively small size is obtained by adjusting the degree of overlapping of the beam 10, which has passed the plate 11, with the associated third transmission aperture 17. The rectangular patterns 27a and 27b are obtained by adjusting the degree of overlapping of the beam 10, which has passed the plate 11, with the associated first transmission aperture 14. See Column 2, line 5-22.

In addition, it is well known in the art to utilize an aperture width of 1 μm or less as recited in Claim 2. For example, see U.S. Patent No. 5,952,155; and U.S. Pub No. 2003/0044697.

Miyajima (604) discloses above the use of a triangular aperture and a quadrangular aperture to draw the oblique side of a pattern (figure), but does not disclose the use of a parallelogrammatic aperture to draw the oblique-side portion of a

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figure, as recited in Claims 3,4 and 6; however, Miyajima (604) as described above discloses in Figures 4C and 4D, the use of parallelogram apertures 29f to 29i in the exposure apparatus and method of the invention.


Therefore it would have been obvious to one of ordinary skill in the art that Miyajima's (604) electron beam exposure apparatus could utilize the available parallelogram apertures 29f to 29i, to draw the oblique-side portion of a pattern, further improving the linearity of the oblique-side of the pattern, if so desired.

Conclusion

6. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (703) 305-7022. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (703) 308-4116. The fax phone numbers are (703) 872-9318 for regular response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ
March 14, 2003


JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800